

Message Text

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FM AMCONSUL JOHANNESBURG

TO SECSTATE WASHDC IMMEDIATE 8159

INFO AMEMBASSY BRUSSELS

AMEMBASSY KINSHASA

AMEMBASSY PRETORIA

AMCONSUL LUBUMBASHI

C O N F I D E N T I A L SECTION 1 OF 5 JOHANNESBURG 2195

E.O. 11652: GDS

TAGS: CG, EMIN

SUBJECT: ZAIRIAN MINERAL PRODUCTION AND OUTLOOK

REF: (A) STATE 187636, (B) LUBUMBASHI 1050

1. SUMMARY AND CONCLUSIONS: AS PREVIOUSLY REPORTED (REF B), REGIONAL RESOURCES OFFICER SWEETWOOD (AMCONSUL JOHANNESBURG) AND AFRICAN SPECIALIST MILLER ELLIS (BUMINES, WASHDC) VISITED LUBUMBASHI/KOLWEZI AREAS AUGUST 21-24. PURPOSE OF VISIT: TO OBTAIN FIRST HAND VIEW OF CURRENT GECAMINES COPPER AND COBALT MINING, PROCESSING AND SHIPPING OPERATIONS AND, SPECIFICALLY, TO ASSESS FUTURE RELIABILITY OF THIS SOURCE AS A SUPPLIER OF COBALT TO THE U.S. SWEETWOOD AND ELLIS WERE ACCOMPANIED ON ALL COURTESY CALLS, AND MINE AND PLANT VISITATIONS, BY AMCONSUL LUBUMBASHI PRINCIPAL OFFICER DANIEL SIMPSON, AMEMBASSY KINSHASA ECON/COMCL COUNSELOR JOHN HEIMANN, AND AMCONSUL LUBUMBASHI ECON/COMCL OFFICER DAVID NOLLE. THE GOALS SET FOR THE ASSESSMENT WERE MET, THANKS VERY LARGELY TO ACCURATE REPORTING EARLIER BY LUBUMBASHI, KINSHASA AND BRUSSELS AND TO THE
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EXCEPTIONAL GUIDANCE, COUNSEL AND SUPPORT (ADMINISTRATIVELY AND AS INTERPRETERS) GIVEN BY THESE OFFICERS DURING THE VISIT. INDICATIONS ARE THAT GECAMINES' OUTPUT IN 1978 MAY REACH 12,000 TONS OF COBALT AND EXCEED 400,000 TONS OF COPPER ON THE STRENGTH OF AN ON-GOING IMPETUS, STIMULATED BY ZAIRIAN WORKER AND CADRE DESIRE TO DEMONSTRATE THAT "WE CAN DO IT OURSELVES". ABSENCE

OF FORMER EXPATRIOT TECHNICAL SUPERVISION, THIN COVER OF QUALIFIED ZAIRIAN TECHNICIANS, AGING MINE AND PLANT EQUIPMENT AND SEVERE FOREIGN EXCHANGE CONSTRICTIONS, HOWEVER, SERIOUSLY THREATEN THE OPERATION ON THE LONGER RANGE. APART FROM POLITICAL OR EXTERNAL INFLUENCES BY FORCE, WE DO NOT FORESEE A CATAclySMIC DROP IN PRODUCTION DURING THE NEXT FEW YEARS, BUT THE START OF A DOWNWARD TREND (POSSIBLY IN 1979) IS ON THE HORIZON. CORRECTIVE ACTION TO PREVENT IMPORTANT PRODUCTION DECLINES WOULD TAKE THE FORM OF ORGANIZATIONAL RESTRUCTURING, MINING PLAN REVISIONS, AND THE PURCHASE OF URGENTLY-NEEDED NEW EQUIPMENT; BUT THESE DEVELOPMENTS MAY WELL APPEAR 'TOO LITTLE OR TOO LATE'. AN IMPROVEMENT IN THE WORLD MARKET PRICE OF COPPER WOULD HELP AS WELL, OF COURSE. IN ANY EVENT, THESE WILL BE THE BASIC FUNDAMENTALS THAT WILL BE INDIVIDUALLY AND COLLECTIVELY INSTRUMENTAL IN THE FUTURE OF GECAMINES. THE EMERGENCE OR DEMISE OF EACH SHOULD BE CAREFULLY WATCHED. END SUMMARY AND CONCLUSIONS.

2. ON AUGUST 21, IN LUBUMBASHI, THE TEAM MET WITH GECAMINES ADMINSTRATOR-DIRECTOR CHARLES PCQUET AND THE DIRECTOR OF EXPLOITATION HENRI SOREL (REGRETTABLY, GECAMINES ADMINISTRATOR DIRECTOR GENERAL, UMBA KYAMITALA, WAS OUT OF TOWN). WE EXPLAINED THAT, WHILE WE WERE AWARE OF GECAMINES' MULTI-PRODUCT

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CAPABILITIES IN COPPER, COBALT, ZINC, CADMIUM, GERMANIUM, SILVER AND (POTENTIALLY) URANIUM, OUR PRINCIPAL INTEREST WAS COBALT -- AND THAT WE WOULD WELCOME MINE/PLANT VISITS AND TECHNICALLY-ORIENTED DISCUSSIONS DIRECTED TOWARD THIS COMMODITY TO THE EXTENT POSSIBLE. PLANS WERE FORMULATED FOR THE TEAM'S VISIT (AUGUST 22-24) TO GECAMINES' "WESTERN DISTRICT" MUTOSHI, KAMOTO AND MUSONOI OPEN PIT MINES, A NEW OPEN PIT DEVELOPMENT (UNNAMED), THE FIRM'S KAMOTO UNDERGROUND MINE, THE MUTOSHI WASHING PLANT, THE KAMOTO AND KOLWEZI CONCENTRATORS AND THE LUILU COPPER/COBALT ELECTROLYTIC REFINERY. IT WAS UNDERSTOOD THAT COPPER MINING, CONCENTRATION AND SMELTING (IN THEIR RELATIONSHIPS WITH COBALT) WOULD BE STUDIED IN DEPTH, WHILE THE CONCENTRATION AND REFINING OF COPPER ALONE, AND ZINC AND OTHER NON-COBALT METALS, WOULD RECEIVE ONLY PERIPHERAL ATTENTION.

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3. ALL MINES VISITED, EXCEPT THE MUTOSHI OPEN PIT, ARE PRODUCERS OF COPPER/COBALT OXIDE AND SULFIDE ORES. MUTOSHI, AS AN ANOMALY IN THIS AREA, YIELDS MALACHITE, CUPRITE AND OTHER ORES OF COPPER AS DISCREET (POSSIBLY TRANSPORTED) PARTICLES, COCRETIONS AND NODULES IN A LOOSELY CONSOLIDATED BRECCIA. VEIN-TYPE OCCURRENCES, OR TRADITIONALLY-FORMED OREBODIES, DO NOT EXIST IN THE MUTOSHI PIT AND COBALT AND OTHER METALS ARE INSIGNIFICANT. KAMOTO, MUSONOI (AND MUPINE) ORES ARE FED TO GECAMINES' KOLWEZI CONCENTRATOR, AND KAMOTO UNDERGROUND ORES (OF GENERALLY LOWER COPPER CONTENT THAN THE OPEN PIT ORES) ARE TREATED IN THE NEARBY KAMOTO CONCENTRATOR. CONCENTRATES FROM BOTH PLANTS (KAMOTO AND KOLWEZI) ARE MOVED BY PIPELINE TO EITHER THE WESTERN DISTRICT'S LUILU OR THE CENTRAL DISTRICT'S SHITURU COPPER/COBALT ELECTROLYTIC REFINERIES AS NEEDED. THE UNIQUE MUTOSHI ORES (LARGELY WELL FORMED MALACHITE IN BOTRYOIDAL AND STALACTITIC MASSES) ARE WASHED, CRUSHED AND GRADED (VIA HEAVY MEDIA SEPARATION) AT THE MUTOSHI WASHING PLANT (LOCATED NEAR THE MINING AREA) AND SHIPPED BY RAIL AS SIZED CONCENTRATES TO GECAMINES' LUBUMBASHI SMELTER

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FOR BLENDING WITH COPPER SULFIDE AND DOLOMITIC COPPER CONCENTRATES FROM THE ORGANIZATION'S SOUTHERN DISTRICT KIPUSHI UNDERGROUND MINE (NOT VISITED).

4. THE KAMOTO AND MUSONOI OPEN PITS ARE ELECTRIC POWER SHOVEL AND OFF-THE-ROAD PIT TRUCK MINING PROGRAMS (U.S.-MADE P&H AND BUCYRUS - ERIE POWER SHOVELS AND UIT RIG LECTRAHAUL 100-TON REAR DUMP TRUCKS), AND THE SINGLE UNDERGROUND OPERATION EMPLOYS BLOCK CAVING AND SHRINKAGE MINING METHODS WITH FRENCH-BUILT RUBBER-TRIED FRONT END LOADERS AND SHUTTLE CARS FEEDING BROKEN ORE TO AN UNDERGROUND GYRATORY (CONE) PRIMARY CRUSHER. AT MUTOSHI, UNCONSOLIDATED CLAY-BEARING WASTE OVERBURDEN IS STRIPPED BY DIESEL POWER SHOVELS AND PIT TRUCKS, AND THE UNDERLYING ("BRECCIA") ORE HORIZON IS MINED BY DRAGLINE AND SIDECASTED ON AN UPPER BENCH LEVEL. "STOCKPILED" ORE IS REMOVED FROM THE PIT AREA BY POWER SHOVEL AND TRUCKS FOR TRANSPORTATION TO THE MUTOSHI WASHING PLANT. WHILE THE DRAGLINE OPERATION AT MUTOSHI LACKS EFFICIENCY BECAUSE OF THE TWO-STAGE ORE HANDLING METHOD USED, IT IS NONETHELESS A REQUIREMENT IF THESE ORES ARE TO BE RECOVERED. EXCESSIVE YEAR-ROUND GROUND WATER IN THE PIT, OF GREATER THAN 10 METERS IN DEPTH ON THE DAY OBSERVED, PRECLUDES SINGLE-STAGE, POWER SHOVEL, METHODS AND RESTRICTS MINING TO THE DRY SEASON ONLY.

5. A REVIEW OF GECAMINES PRODUCTION SINCE 1967 CLEARLY REVEALS THE INESCAPABLE COPRODUCT ROLE OCCUPIED BY COBALT WITHIN THIS ORGANIZATION'S OVERALL OPERATING PLAN, AND (CONCURRENTLY) THE VARYING DEGREES OF IMPORTANCE GIVEN TO COBALT ANNUALLY. WHILE BOTH COPPER AND COBALT RECOVERIES INCREASED NOTABLY DURING 1967-1974, EMPHASIS WAS LARGELY ON COPPER -- EVEN THOUGH MARKETING CONDITIONS

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WERE FAVORABLE FOR BOTH COMMODITIES DURING THIS PERIOD. COPPER OUTPUT INCREASED STEADILY FROM 319,000 TONS OF METAL IN 1967 TO A HIGH OF 471,000 TONS IN 1974. MEANWHILE, COBALT WAS UP AS WELL (FROM 9,700 TONS IN 1967 TO 17,500 TONS IN 1974), BUT GAINS WERE ERRATIC AND INCLUDED A DECLINE FROM 14,500 TONS IN 1971 TO 13,000 TONS IN 1972 FOLLOWED BY A SIGNIFICANT CLIMB TO THE 17,500-TON PLATEAU REACHED IN 1974. THE WEAKENED WORLD COPPER MARKET SINCE 1974 HAS TAKEN ITS TOLL IN GECAMINES, OF COURSE, THOUGH 1975-1976 DECLINES IN COPPER OUTPUT WERE MODERATE COMPARED TO THE FALL-OFFS IN COBALT. COPPER IN 1976 WAVERED DOWNWARD TO 407,704 TONS WHILE COBALT WAS ALLOWED TO SLIDE TO 1968-1969 LEVELS (AT 10,686 TONS). GECAMINES' 1977 REPORT IS NOT YET AVAILABLE, BUT PICQUET, WALA (REPRESENTATIVE OF THE DELEGATE GENERAL, WESTERN DISTRICT) AND SCHAJES (DIRECTOR OF MINES AND QUARRIES) ALL MAINTAIN THAT COPPER PRODUCTION 1977 WAS HELD TO THE 1976 LEVEL; AND THAT A "NKCEW" EMPHASIS HAS BEEN PLACED ON COBALT.

REPORTEDLY, COBALT PRODUCTION IN 1977 TOTALED 11,582 TONS AND A 12,000-TON OUTPUT IS CURRENTLY FORECAST FOR 1978.

6. WHILE IT IS POSSIBLE TO MODERATELY VARY (E.G. 'INCREASE') COBALT PRODUCTION WITHIN THE FRAMEWORK OF GECAMINES' INSTALLED CONCENTRATOR AND ELECTROLYTIC SMELTER CAPACITIES, THE ULTIMATE OUTPUT (BARRING IRRESPONSIBLE "HIGHGRADING" OF COBALT RESOURCES) IS AT ALL TIMES TIED TO COPPER BECAUSE OF THE PHYSICAL AND CHEMICAL ASSOCIATION OF ONE TO THE OTHER IN ORE. HISTORICAL RECORDS AT GECAMINES CONFIRM THE TEAM'S VIEW THAT IF COPPER PRODUCTION IN 1978 IS TO BE "HELD" TO SAY) THE 1976 LEVEL (APPROXIMATELY 408,000 TONS), A 12,000-TON COBALT YEAR WOULD REPRESENT ABOUT 80 PERCENT OF A PRACTICAL COBALT PRODUCTION YEAR. THAT IS, A "NEW" EMPHASIS ON COBALT COULD YIELD 15,000 TONS ANNUALLY (AT THE CURRENT COPPER
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PRODUCTION LEVEL), PROBABLY WITHOUT 'CANNIBALIZING' EXISTING MINES OF THEIR HIGHEST GRADE COBALT ORES. ANY VOLUME BEYOND THIS 'MAXIMUM', HOWEVER (AT THE CURRENT

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PRODUCTION OF COPPER), WOULD INDEED BEGIN THE IRRETRIEVABLE DEPLETION OF THE AREA'S HIGH GRADE BLENDABLE ORES. ALTERNATIVELY, ADDITIONAL 471,000-TON COPPER YEARS (AS IN 1974) COULD ONCE AGAIN YIELD 17,500 TONS OF COBALT ANNUALLY OVER THE LONG RANGE WITHOUT SERIOUS MODIFICATION TO THE NORMAL COPPER/COBALT CHEMICAL BALANCE, AND PROBABLY WITHOUT THREAT TO AN ABNORMAL DEPLETION OF COBALT RESOURCES. AS ALMOST A FOOTNOTE TO THE ABOVE, ON-GOING CONSTRUCTION TO EXPAND INSTALLED CAPACITY AT THE LUILU REFINERY WILL ULTIMATELY FURTHER RAISE COBALT OUTPUT CAPABILITIES.

7. THE POSSIBILITIES OF AN IRRESPONSIBLE DEPLETION OF COBALT ORES ON ONE HAND, A REPORTED EMPHASIS TO ACHIEVE A 15,000-TONE COBALT YEAR(HOPEFULLY VIA ACCEPTABLE PROCESSING METHODS) ON THE OTHER, AND (FINALLY) CONSIDERATIONS OF EVEN GREATER TONNAGES THROUGH IMPROVED COPPER SALES AND/OR PLANT EXPANSION PROGRAMS STRANGELY SEEM TO BE MERELY ACADEMIC CONJECTURES ONLY, HOWEVER -- GIVEN EXISTING CIRCUMSTANCES OTHERWISE. INDICATIONS ARE THAT, WHILE THE PROBLEMS OF GEOLOGY, ENGINEERING AND CONFIDENTIAL

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MARKETING ARE EXTREMELY IMPORTANT (AND WON'T GO AWAY EASILY), THE FUTURE OF THIS ORGANIZATION WILL BE MORE LIKELY DICTATED BY EVENTS OF THE RECENT PAST AND THE CONTINUING VIABILITY OF GECAMINES' CURRENT OPERATING STRUCTURE.

8. THE MAGNITUDE OF THE GECAMINES OPERATION, THE VARIATIONS IN THE TYPES AND GRADES OF ORE AVAILABLE FROM EACH OF THE MINES, THE BLENDING REQUIRED OF THESE ORES IN THE CONCENTRATORS AND THE PRODUCTION FROM EACH OF THE REFINERIES COMBINE TO PROVIDE MANY POTENTIAL BOTTLENECKS AND POSSIBLE DECLINES IN FINAL PRODUCT OUTPUT. IT IS A 'COMPLEX' THAT DEMANDS EFFICIENCY FROM MEN AND EQUIPMENT IN THE MINES AND PLANTS, PRECISE QUALITY AND QUANTITY CONTROL, ADEQUATE OPERATING FUNDS, AND EXCEPTIONAL MANAGEMENT EXPERTISE. EACH OF THESE DISCIPLINES (INDEED, ALL SEGMENTS OF MINING AND PROCESSING) HAD BEEN HISTORICALLY THE RESPONSIBILITY OF BELGIAN, FRENCH, AND OTHER EXPATRIOTS IN THE PAST -- MANAGERS, GEOLOGISTS, MINING AND DESIGN ENGINEERS, METALLURGISTS, MECHANICS, MACHINISTS, ELECTRICIANS, ETC. TODAY, THE WESTERN DISTRICT AT KOLWEZI IS MANNED EXCLUSIVELY BY ZAIRIAN PROFESSIONALS, ARTISANS AND LABORERS AND, FOR THE MOMENT AT LEAST, A EUPHORIC HONEYMOON SEEMS TO BE CONTINUING. EARLIER IRRITANTS CREATED BY THE EXPATRIOTS HAVE BEEN REMOVED, AND AN AIR OF 'TOGETHERNESS' ("WE CAN DO IT OURSELVES") EXISTS IN THE ORGANIZATION. IN THE TEAM'S VIEW, HOWEVER, THE FUTURE IS ANOTHER ISSUE. ABOVE ALL

ELSE, THE MOST DISTURBING DISCOVERY EXISTS AT THE GRASS ROOTS LEVEL. GECAMINES-KOWEZI, TODAY, IS REPORTEDLY OPERATING WITH LESS THAN HALF OF ITS FOREIGN EXCHANGE NEEDS AND, ACCORDING TO TWO AUTHORITATIVE SOURCES, THERE IS CURRENTLY NO NEW MINING EQUIPMENT ON ORDER.

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9. IN THE OPEN PIT MINES, ONLY ONE POWER SHOVEL IS OF RECENT VINTAGE. ALL OTHERS OBSERVED RANGE IN AGE FROM 10-20 YEARS, AND EACH CLEARLY IS CURRENTLY WORKING ON BORROWED TIME. THREE POWER SHOVELS WERE DOWN FOR MAJOR REPAIRS. PIT TRUCKS WERE GENERALLY OPERATING WELL, BUT ACCORDING TO THE MINE AND QUARRY MANAGER, MUTEBA, "A NUMBER" WERE IN NEED OF MAJOR OVERHAUL BUT WERE BEING KEPT ON LINE NONETHELESS BECAUSE OF THE LACK OF REPAIR PARTS AND INSUFFICIENT STANDBY UNITS FOR FILL-IN. (MUTEBA ADMITTED TO FOUR UNITS CURRENTLY OPERATING WITH OVER 15,000 HOURS ON THE ENGINES SINCE LAST MAJOR OVERHAULS. THESE WERE OBSERVED IN ACTION. INJECTOR PROBLEMS AND EXCESSIVE FUEL AND OIL CONSUMPTION WERE APPARENT.) DOZERS (CATERPILLAR, D-8'S) WERE GENERALLY IN DISREPUTABLE CONDITIONS. ALL ARE OLD, ALL SHOW SIGNS OF REPAIRS ON TOP OF REPAIRS, AND THERE ARE INSUFFICIENT NUMBERS TO PERFORM THEIR BASIC TASKS OF PIT CLEAN-UP AND WASTE DUMP LEVELLING. ROAD GRADERS (CATERPILLAR AND GALION) (ALSO OLD IN AGE) PERFORM CERTAIN OF THESE DUTIES AT THE EXPENSE OF PIT ROAD MAINTENANCE. UNDERGROUND EQUIPMENT, THOUGH NOT OBSERVED TO THE FULL EXTENT DESIRED, APPEARED TO BE IN REASONABLY GOOD CONDITION; BUT HERE, ALSO, SPARES ARE ADMITTED TO BE IN SHORT SUPPLY.

10. THE KOLWEZI (1941) AND KAMOTO (1968) CONCENTRATORS WERE OPERATING AT RESPECTABLE LEVELS WHEN INSPECTED. THE OLDER KOLWEZI UNIT SHOWS SERIOUS SIGNS OF DETERIORATION, HOWEVER, AND REQUIRES ABOVE-AVERAGE MAINTENANCE AND REPAIR TO SUSTAIN CURRENT LEVEL OF PRODUCTION. THE PROBLEM AREA EXISTS IN THE CONCENTRATOR'S OUTMODED (1940/41-MODEL DENVER SUB-A) FLOTATION CELLS (BALL AND ROD MILLS WERE OPERATING EFFICIENTLY). SMALL BY TODAY'S STANDARDS AND THE ON-GOING REQUIREMENTS OF THIS CONCENTRATOR, THE CELLS ARE BEING OVER-FED, OVER-WORKED, AND (TO A NOTICEABLE

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DEGREE) ARE BEING HELD TOGETHER BY MAKESHIFT REPAIRS. THE DIRECTOR OF THE KOLWEZI CONCENTRATOR, LYOLO, AGREED THAT REPAIRS FREQUENTLY FOLLOW THE COURSE OF "ROBBING FROM ONE CELL TO REPAIR ANOTHER", THAT PULP RETENTION TIMES ARE INADEQUATE (CAUSING METAL LOSSES), THAT PH CONTROL (THEORETICALLY INTENDED TO BE HELD AT 9.2, BUT WHICH "OCCASIONALLY" FALLS TO ACIDIC READINGS) "IS NOT PRECISE" AND THAT CELT LINING CORROSION IS NEARING CRITICAL STAGES (EASILY OBSERVABLE). THE KAMOTO CONCENTRATOR ON THE OTHER HAND, APPEARS AT THE PRESENT TIME TO BE VIRTUALLY TROUBLE-FREE. THE NEWER, AND LARGER, WEMCO FLOTATION CELLS WERE IN GOOD OPERATING CONDITION, BALL, ROD AND CASCADE MILLS WERE ALL "ON LINE", CHEMICAL CONTROL IS ADEQUATE, AND HOUSEKEEPING PROCEDURES WERE EXCELLENT. NO MAJOR DIFFICULTIES ARE FORESEEN FOR THIS CONCENTRATOR ON THE SHORT TERM.

11. REPORTEDLY, THE KOLWEZI CONCENTRATOR IS CURRENTLY RECEIVING 15,000 TONS OF MINE-RUN, IPEN PIT, COPPER/COBALT ORE DAILY AT AN AVERAGE QUALITY OF 6.0 PERCENT COPPER AND 0.7-1.0 PERCENT COBALT. OXIDE ORES ARE UPGRADED TO 20.0 PERCENT COPPER (WITH LITTLE OR NO IMPROVEMENT IN THE COBALT CONTENT AT THIS STAGE) WHILE SULFIDE ORES ARE CONCENTRATED TO

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40.0 PERCENT COPPER AND 1.5 PERCENT COBALT. OUTPUT AT KOLWEZI IS REPORTED AT AN AVERAGE OF 12,500 TONS OF CONCENTRATES (OXIDES AND SULFIDES) DAILY. THE KAMOTO CONCENTRATOR PROCESSES ORE MINED BY UNDERGROUND METHODS ONLY (LARGELY SULFIDE ORES), AT AN AVERAGE INPUT GRADE OF 3.0-4.0 PERCENT COPPER AND 0.7 PERCENT COBALT. INPUT FEED AVERAGES 12,500 TONS OF ORE DAILY AND CONCENTRATES PRODUCED AVERAGE 9,500-10,000 TONS AT QUALITY RANGES OF 40.0-50.0 PERCENT COPPER AND 2.0-3.0

PERCENT COBALT (FOR SULFIDES) AND 20.0 PERCENT COPPER AND 0.7 PERCENT COBALT (FOR OXIDES). THE UPGRADED PRODUCTS FROM BOTH CONCENTRATORS ARE MOVED BY PIPELINE (AT 26.5 PERCENT SOLIDS) TO EITHER THE WESTERN DISTRICT LUILU ELECTROLYTIC REFINERY OR THE CENTRAL DISTRICT SHITURU REFINERY AS NEEDED.

12. AT THE LUILU REFINERY, SULFIDE CONCENTRATES ARE ROASTED PRIOR TO LEACHING AND SEPARATION OF THE COBALT FROM THE COPPER, WHILE OXIDE (AND DOLOMITIC) CONCENTRATES ARE FED DIRECTLY TO LEACH UNITS AND ELECTROLYSIS. AS TO COBALT, TWO FINAL PRODUCTS ARE MADE; GRANULES AND ELECTRO COBALT SLABS. AT THE TIME OF THE INSPECTION BOTH WERE IN PRODUCTION AT WHAT APPEARED TO BE NORMAL LEVELS, AND BOTH WERE BEING PREPARED FOR IMMEDIATE RAIL (EXPORT) SHIPMENT. LUILU'S REFINERY DIRECTOR, GAPARAY, AND THE WESTERN DISTRICT'S REPRESENTATIVE OF THE DELEGATE GENERAL, WALA, CLAIMED (AT DIFFERENT TIMES) THAT THIS REFINERY REALIZES A COBALT OUTPUT OF 800 TONS MONTHLY. THIS APPEARED TO THE TEAM TO BE DISPROPORTIONATELY HIGH (AT, SAY, 9,600 TONS ANNUALLY), AND POSSIBLY WELL ABOVE ACTUAL PRODUCTION AT THE PRESENT TIME. INDEED, SEVERAL KEY STATISTICS GIVEN TO THE TEAM ARE OPEN TO QUESTION.

13. NOT TO BE IGNORED IS THE RELATIVELY HIGH COBALT
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CONTENT OF THE MINE-RUN ORE SAID TO BE THE MINES' "ANNUAL AVERAGE" (PARA 11). WHILE QUESTIONABLE (AT 0.7-1.0 PERCENT COBALT), ORES NONETHELESS EXIST IN THE KOLWEZI AREA THAT COULD, IN FACT, RAISE THE OVERALL AVERAGE TO 2-3 PERCENT OR MORE -- TO THE DETRIMENT OF LONG RANGE PLANNING (PARA 6). GOOD PLANNING, HOWEVER, REQUIRES CAREFULLY ORCHESTRATED SELECTIVE MINING AND BLENDING AND EFFICIENTLY-RUN CONCENTRATORS. WE THUS BELIEVE THAT, IF THE COBALT GRADE IS BEING HELD TO THE 0.7-1.0 PERCENT LEVEL (AS CLAIMED), EITHER ON OVERLY-HIGH GRADE ORE IS 'REQUIRED' TO MEET INEFFICIENT CONCENTRATION AND METAL LOSSES IN THE CONCENTRATORS OR THE HIGHER GRADE IS 'DESIRED' IN ORDER TO ACHIEVE THE FINAL PRODUCT OUTPUT PROMISED BY THE MANAGEMENT FOR 1978. WE SUSPECT THAT THE QUALITY OF THE CONCENTRATES (FROM KOLWEZI IN PARTICULAR) MAY BE SOMEWHAT BELOW THE PERCENTAGES GIVEN (CHEMICAL ANALYSES WERE NOT MADE AVAILABLE TO THE TEAM), THAT METAL LOSSES IN PROCESSING (IN CONCENTRATION, LEACHING AND PRECIPITATION) MAY BE CURRENTLY EXCESSIVE, AND THAT SULFURIC ACID/ELECTROLYTIC PROCESS CONTROL PROBLEMS OBSERVED IN THE LUILU REFINERY MAY WELL REFLECT THE CURRENT MANAGEMENT'S INEXPERIENCE IN THIS DISCIPLINE. THE FINAL PRODUCT, AS A HIGH-PURITY COBALT METAL, CANNOT BE FAULTED.

14. IT IS CONCLUDED THAT, AGING EQUIPMENT, POSSIBLE
INEFFICIENCIES AND KNOWN FOREIGN EXCHANGE CONSTRUCTIONS
NOTWITHSTANDING, U.S. COBALT END-USERS CAN REMAIN
REASONABLY CERTAIN THAT GECAMINES WILL PRODUCE COBALT AT
LEAST AT THE 1976/77 OUTPUT LEVELS FOR THE REMAINDER OF 1978.
IT WOULD BE UNREALISTIC TO PRESUPPOSE THAT AN OPERATION OF
THIS MAGNITUDE WOULD (OR EVEN COULD) COME TO A SUDDEN HALT
IN THE SHORT TERM -- APART FROM THE EFFECTS OF A MAJOR
COUNTRYWIDE POLITICAL UPHEAVAL OR EXTENAL INFLUENCES
FOCUSING ON THE CLOSURE OF THE MINES BY FORCE. ON THE
LONGER RANGE, INTO 1979 AND BEYOND, AN ENTIRELY DIFFERENT
PICTURE IS EMERGING, HOWEVER, AND TWO ADDITIONAL (I.E.
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ALL-ENCOMPASSING) CONSIDERATIONS THREATEN THE ULTIMATE
FUTURE OF GECAMINES - KOLWEZI; (1) THE STATE OF EXISTING
AND PLANNED MINING METHODS; AND (2) THE OUTLOOK, VIS-A-VIS
THE MANAGEMENT'S ABILITY TO MEET ITS PERSONNEL AND EQUIPMENT
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15. A MINING PROBLEM OF MAJOR PROPORTIONS, CREATED SOLELY
BY EARLIER MINE PLANNERS AND ONLY INHERITED BY THE NEW

MANAGEMENT, SERIOUSLY THREATENS THE LIFE OF EACH OPEN PIT MINE OBSERVED -- AND THUS THE BULK OF THE ORE CURRENTLY BEING MINED AND PLANNED FOR THE FUTURE. THE IMPORTANT PRODUCING PITS HAVE BEEN IN EXISTENCE FOR A NUMBER OF YEARS, AND ALL RANGE IN DEPTH FROM 50-200 METERS. ALL ARE CLASSICALLY-BENCHED PITS OF THE TYPE NORMALLY FOUND IN COMPETENT GEOLOGIC STRUCTURES. AT KOLWEZI, HOWEVER, OVERBURDEN IS OF UNCONSOLIDATED AND LOOSELY CONSOLIDATED SEDIMENTS; FLAT-DIPPING BEDS OF SOFT CLAYS, PARTIALLY ALTERED LIMESTONES AND DOLOMITIC LIMESTONES, AND BRECCIATED MATERIALS WITH LITTLE OR NO STABILITY. CONVERSELY, ORE HORIZONS ARE GEOLOGICAL NIGHTMARES; REQUIRING SELECTIVE MINING AND PRECISE IN-PIT QUALITY CONTROL. METALLIFEROUS ZONES ARE GENERALLY STEEP DIPPING AND COMMONLY FOLDED, OVERTURNED AND FAULTED (WITH SOME ALTERATION). THE "WANDERING" NATURE OF THE ORE OCCASIONALLY CROWDS TOO CLOSE (FOR SAFETY) TO UPPER WASTE BENCHES, TO CREATE EITHER DANGEROUS MINING CONDITIONS OR WHAT BECOMES AN INTENTIONAL LOSS OF OTHERWISE RECOVERABLE ORES. MOST IMPORTANTLY, HOWEVER, EXISTING PIT BACKSLOPES

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ARE CONSIDERED BY THE TEAM MEMBERS TO BE THE POOREST, AND POSSIBLY THE MOST DANGEROUS, OBSERVED WORLDWIDE FOR AN OPERATION OF THIS SIZE. MAJOR BACKSLOPE FAILURES ARE AN ANNUAL OCCURRENCE (LARGELY DURING THE WET SEASON). ONE POWER SHOVEL (CURRENTLY BEING RE-BUILT) WAS BURIED RECENTLY, AND REPORTEDLY LARGE BLOCKS OF ORE HAVE BEEN "LOST" UNDER THOUSANDS OF TONS OF SLUMPED WASTE AFTER COSTLY PREPARATIONS FOR MINING. FINALLY, GROUND WATER ENCROACHMENT IS CURRENTLY REACHING CRITICAL PROPORTIONS IN SEVERAL OF THE PITS OBSERVED. DISAGREEMENTS ARE MOUNTING BETWEEN MINE OPERATING PERSONNEL AND GECAMINES LUBUMASHI AS TO HOW BEST TO HANDLE THE WATER PROBLEM ON THE LONG RANGE. DECISIVENESS IS LACKING -- AND MEANWHILE, TEMPORARY SUMPS SUFFICE, BUT MOST COVER RECOVERABLE ORES. HENCE, ONLY COMPLETELY RE-DESIGNED OPERATIONS IN EXISTING PITS, AND APPROPRIATE APPLICATION OF ROCK MECHANICS TO NEW MINING AREAS, CAN FORESTALL SERIOUS ORE RECOVERY CUTBACKS AND THE LOSS OF LIFE AND EQUIPMENT IN THE YEARS TO COME.

15. CURRENTLY, THE MORALE OF SOME 33,000 MINE AND PLANT WORKERS WITHIN THE TOTAL GECAMINES STRUCTURE IS HIGH AND THE EQUIPMENT, THOUGH NOTABLY PATCHED UP, IS OPERATING. YET, THE NEW (KOLWEZI) MANAGEMENT IS CLEARLY WORRIED AND UNSURE OF THE FUTURE. THEY ARE WELL AWARE THAT, WITHOUT THE EARLIER BELGIAN (AND OTHER) EXPATRIOT TECHNICAL PERSONNEL, THE PRESENT ORGANIZATION LACKS DEPTH IN EXPERIENCED ENGINEERS, MASTER MECHANICS, ELECTRICIANS, MACHINISTS AND OTHER VITALLY IMPORTANT JOB CLASSIFICATIONS. THE KOLWEZI MANAGEMENT IS OF THE VIEW THAT ABOUT 90 TECHNICIANS (OF THE CALIBER CITED) ARE REQUIRED

JUST FOR THE SHORT RUN. REPORTEDLY, HOWEVER, GECAMINES
LUBUMBASHI PLANS TO EMPLOY SUBSTANTIALLY FEWER (NUMBER
NOT SPECIFIED). MEANWHILE, SUPERVISORS AT VARIOUS OPERATING
LEVELS STRESSED GROWING EQUIPMENT BREAKDOWNS, SHORTAGES
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OF SPARE PARTS, AND THE TOTAL LACK OF NEW EQUIPMENT ORDERS
(WITH "NORMAL" DELIVERY DELAYS OF 1-2 YEARS PER MAJOR ITEM
-- E.G. A NEW BUCYRUS-ERIE POWER SHOVEL, JUST RECEIVED,
HAD BEEN ON ORDER FOR FOUR YEARS). IT IS ESTIMATED THAT
NEW MINE AND PLANT EQUIPMENT REQUIRED TO SUSTAIN CURRENT
OPERATIONS THROUGH 1990 WOULD REQUIRE MINIMUM CAPITAL
OUTLAY OF \$50.0 MILLION AND THAT SPARES TO MAINTAIN EACH
WOULD EQUAL THIS AMOUNT AT TODAY'S PRICES. THE FIRST
DELIVERIES COULD NOT BE ANTICIPATED, HOWEVER, UNTIL (SAY)
THE 1979/80 PERIOD -- IF ORDERS COULD BE PLACED
IMMEDIATELY. THUS, AN OPERATIONAL 'GAP' IS IN THE
MAKING; ONE THAT MAY BE EXPECTED TO BE FELT
GRADUALLY VIA PRODUCTION DECLINES, POSSIBLY FIRST
DURING 1979. THE LONGER ADEQUATE EXPERTISE AND NEW
EQUIPMENT ARE WITHHELD FROM THIS OPERATION, THE GREATER
WILL BE THE POSSIBILITIES FOR MAJOR PRODUCTION DROPS IN
1980, AND BEYOND.
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